NERRS Science Collaborative Progress Report for the Period 03/01/2013 – 08/31/2013

Project Title: *Developing a Low Impact Development Manual for Coastal South Carolina to Serve as Guidance for Improved Stormwater Management*

Principal Investigator: Blaik Keppler; ACE Basin National Estuarine Research Reserve

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Report Compiled by: Blaik Keppler; Project Coordinator, ACE Basin National Estuarine Research Reserve and Kathryn Ellis, Project Assistant, North Inlet-Winyah Bay National Estuarine Research Reserve

Contributing Team Members and their role in the project:

- April Turner; Collaboration Assistant, South Carolina Sea Grant Consortium
- Greg Hoffmann, P.E.; Applied Science Lead, Center for Watershed Protection
- Sadie Drescher; Applied Science Investigator, Center for Watershed Protection

A. Progress overview:

The overall goal of this project is to produce a *Low Impact Development Manual for Coastal South Carolina* to provide local decision makers with the knowledge and resources to help them implement LID practices on the community, neighborhood, and site scale. To develop a guidance manual that will effectively inform its intended users, the project team is conducting a series of collaborative workshops and focus group meetings with applied science researchers and engineers to develop and tailor stormwater best management practices and an engineering spreadsheet tool to the hydrologic and soil conditions of the South Carolina coast. Simultaneously, the project team is also facilitating meetings with planners, landscape architects, and developers to ensure that the LID Manual provides appropriate land-use planning, site design, and ordinance guidance. Stormwater and climate change experts will then identify if and how these tools and guidance can be adapted to ensure they will be effective under changing climate conditions, such as increased variability in rainfall.

Progress on tasks for this reporting period:

The major tasks defined in the project timeline and that the project team focused on during this period include:

1. *LID Manual Advisory Committee Meetings*: The LID Manual Advisory Committee (LID MAC) held two meetings during this period; March 15th and June 18th. The MAC continues to serve as a valuable steering committee for the Manual development and stakeholder engagement process.
2. *Climate specialists and project team meeting*: The climate specialists and project team have had several conference calls to discuss how climate research and information can inform current and future LID practices. In addition, planning for a climate-related workshop has begun.
3. *Intended User Workshop #3*: This workshop will address climate change implications in coastal South Carolina and identify adaptation considerations for LID practices. Due to scheduling conflicts, it will be held very early in the next reporting period (September 20th).
4. *Synthesis of intended user workshops 1, 2, and 3*. As stated in the last progress report, Workshops 1 and 2 were combined and held during the previous reporting period. An additional stakeholder event, the Research Roundtable (discussed below) was held during this period and evaluation data, presentation information, discussion notes, and other anecdotal information from both events continue to be used by the project team for guidance development.

5. *Research Roundtable Discussion:* This discussion occurred on April 16th partly to account for items that were not included in Workshop 1 and partly out of a need for better understanding of locally relevant research and implementation challenges. This focused discussion including local researchers as well as design and review engineers addressed coastal conditions and designing LID practices taking these challenges into consideration.

6, 7, 8 *Development of up to 15 BMP specifications and compliance spreadsheet tool, development of planning and landscape design guidance, development of coastal South Carolina case studies:* Drafts of all items listed are complete and are currently being reviewed by the core project team.

9. *Drafting of LID Manual:* Manual drafting and development began in Quarter 4 and will continue through at least the next two quarters.

B. Working with Intended Users:

During this grant period, intended user engagement occurred through the project's advisory committee, a focused research discussion, and through direct interaction and conversations between project team members and coastal decision-makers.

Research Roundtable Discussion

The Research Roundtable Discussion (held April 16th) came out of a need to better understand local research and the design and implementation of LID practices in South Carolina's coastal conditions. Some design and implementation challenges were discussed at Stakeholder Workshop #1, but to address these concerns, the project team needed more specific information about the coastal hydrology, soils, and other physical conditions that place constraints on LID Design. The team also wanted to ensure that the most current, locally relevant scientific information is used for designing BMP specifications.

Fifteen stakeholders participated in the discussion including local researchers, design engineers and consultants, a representative from the state's stormwater regulatory agency (SC DHEC), and several members of the LID Manual Advisory Committee. The researchers and stakeholder representatives were chosen very deliberately to include the most relevant and current research; additionally, engineers were included to provide insights from their experiences with designing and implementing BMPs. These engineers had attended Workshop 1 in January and had indicated that they were willing to serve in an advisory capacity. The Researchers began by giving the group and project team an overview of their research as it relates to LID in the coastal zone. Topics included coastal hydrology and urbanization, runoff predictions, bioretention monitoring, modifies coastal streams and ditches, bacteria loading, stream sensitivity to freshwater inputs, and nutrient interactions in stormwater ponds.

Very productive questions and discussion on the following topics followed:

1. Physical conditions that challenge low impact development practices in the coastal zone.
2. Adjustments for designing BMPs in the coastal zone.
3. Impairments and pollutants of concern in the coastal zone: nitrogen, phosphorus, sediment, bacteria, etc.
4. BMP modifications for specific pollutants.

The group also discussed specific BMPs that may be included in the Manual: green roofs, cisterns and water harvesting, disconnection, permeable pavement (to include many different types), bioretention (to include stormwater planters), infiltration, vegetated swales, dry ponds, wet ponds, stormwater

wetlands, sand filters, floating wetlands, tree planting or forest conservation, pond buffers, soil amendments, flat roof evaporation. Discussing these practices and their performance in terms of water quality and quantity control as well as feasibility in coastal South Carolina directly influenced whether they are included in the Manual, and if so, their design specifications.

Figure 1. Dr. Ani Jayakaran from Clemson University tells the group about how ditching has altered coastal hydrology.

Figure 2. Dr. Dan Hitchcock from Clemson University outlines his research focused on runoff predictions and bioretention monitoring.

Figure 3. Participants listen in as researchers take turns presenting their work.

Figure 5. Kim Jones, Water Quality Manager for the Town of Bluffton joined via Skype and presented information about bacteria inputs to the May River.

LID Manual Advisory Committee

The LID Manual Advisory Committee (LID MAC) held two meetings during this period: March 15th and June 18th. During the first meeting, the Committee evaluated the previous stakeholder workshop; developed a strategy for engaging stakeholders who volunteered to serve as additional technical advisors; discussed requiring versus recommending standards with regard to volume and pollutant control; planned for the Research Roundtable held in April; and suggested potential LID case studies.

During the second meeting, the Committee reviewed the Research Roundtable, began planning for a climate discussion and a stakeholder workshop, and provided advice for draft LID case studies.

Engaging Intended User Experts
This grant period, the CTP Assistant has focused on working with many stakeholders to research information related to stormwater design requirements, ordinances, and potential case studies to include in the LID manual. She has contacted officials and administrators within all 8 counties and 51 municipalities along the coast to discuss how these jurisdictions address stormwater management and low impact development BMPs. In addition to ordinances and engineering design requirements, the Assistant has been researching potential case study features to be included in the manual. She has interacted via telephone, email, and in-person site visits with a total of 94 engineers, landscape architects, property managers, developers, planners, researchers, contractors, HOA delegates, educators, plant experts, business owners, and various other volunteers. The diversity of stakeholders involved in this project reflects the complexity of strategies being employed throughout the Lowcountry to address stormwater issues. Expertise and experiences shared by these individuals has been invaluable to the project team in developing the Manual.

In the next six months
Early in the next grant period, climate scientists, the project team and stakeholders will gather to discuss how climate research and information can inform current and future LID practices. This discussion will lead to recommendations in the Manual about planning for future conditions and designing LID practices that take into account future precipitation scenarios.

Additionally, as guidance is developed, intended users will be consulted to ensure that the manual (a) addresses their suggestions and concerns, (b) is clear and user-friendly, and (c) appropriately accounts for the natural conditions of coastal South Carolina. These steps will help ensure that the project team is creating a product that stormwater and development practitioners will be able to use in their decision-making. We will leverage the support of the intended users who volunteered to serve on the Manual Advisory Committee for this task by asking them to review portions of the guidance manual or participate in interviews or focus groups.

In addition to consulting with specific intended users on the format and content of the Manual, an additional workshop will help the project team refine and finalize the guidance. The team will present draft versions of technical specifications, the compliance calculator, the site design and planning guidelines and checklist, and case studies. Interactive sessions will allow participants to test components of the Manual and provide feedback to ensure that it will meet their needs.

C. Progress on project objectives for this reporting period:

The overall goal of this project is to increase implementation of LID practices through the collaborative development of a *Low Impact Development Manual for Coastal South Carolina.* To accomplish this, the following project objectives are defined:
- Objective 1: Remove targeted barriers to LID implementation by providing engineers, planners, and other coastal decision-makers with guidance specific to their individual professional needs.
- Objective 2: Develop LID BMP engineering tools and planning guidance for South Carolina coastal communities that are relevant under current and future climatic conditions.

Objective 3: Increase the capacity of local officials, stormwater professionals, and developers to implement LID strategies by providing effective training for coastal communities.

During the second grant period, the project team continued to work on Objective 1 and began work on Objective 2. The Research Roundtable discussion held on April 16, 2013 was designed to ask questions that will allow us to develop guidance specific to stormwater design and review engineers. The project team is using this input to move forward with designing technical guidance. The team is now using input from this discussion, from the earlier intended user workshop, and from individual interaction with stakeholders to develop engineering tools and planning guidance.

Data Collection

Data collected at the Research Roundtable discussion is qualitative and includes notes and evaluation comments. The project team is using this data to make decisions about the guidance that will be developed for and included in the LID Manual. There has also been a great deal of data collected from individual interaction with stakeholders. Many stakeholders have provided information about their community's stormwater requirements. This data has been used not only to help inform the project team about the nuances of South Carolina coastal communities' stormwater practices, but also as inputs to a table that will be shared with stakeholders in the Manual so that they can view other communities' practices in one location. Also, intended users continue to provide valuable information about case studies; development or stormwater related projects that they have worked on. The project team also continues to use the LID atlas, an on-line nationwide clearinghouse of LID project, to find locally relevant case studies.

Changes to methods

Our progress during this period has brought about one slight change to our method with respect to Intended User Workshop #3, the workshop to address climate change implications in coastal South Carolina and identify adaptation considerations for LID practices. Rather than a large stakeholder workshop, the project team has decided to employ a roundtable discussion approach to this topic which will include climate scientists as well as key stakeholders from several professional sectors, such as planning, engineering, and the regulatory sector.

There are two reasons for this change. First and foremost, the project team found the focused, roundtable type discussion to be an extremely effective method of communication with stakeholders while discussing research topics. Because of the complexity and hypothetical nature of the topic of future conditions related to current stormwater design practices, the project team felt that a smaller discussion with a highly targeted participant list would lead to much more effective discussion. Another reason for this modification is staffing changes. During this grant period, our project team learned that the Climate Outreach Specialist from the SC Sea Grant Consortium was leaving her position and would no longer be part of this effort. The team quickly was able to secure a partnership with climate specialists at the Carolinas Integrated Sciences and Assessments (CISA) Program at the University of South Carolina, but the transition has led to some challenges with scheduling and lost time for workshop planning.

Plans for meeting project objectives

In the next six months, project staff will continue to make progress on Objective 1 (*providing engineers, planners, and other coastal decision-makers with guidance specific to their individual professional needs*) As guidance is developed, intended users will be consulted to ensure that the manual (a) addresses their suggestions and concerns, (b) is clear and user-friendly, and (c) appropriately accounts for the natural

conditions of coastal South Carolina. These steps will help ensure that the project team is creating a product that stormwater and development practitioners will be able to use in their decision-making.

The team will also begin to address Objective 2 in the next reporting period (*Develop LID BMP engineering tools and planning guidance for South Carolina coastal communities that are relevant under current and future climatic conditions*). We will bring together the project applied science staff, local and regional climate scientists, and researchers whose work connects stormwater with climate to discuss the integration of climate scenarios with stormwater design tools.

In the next grant period, the team will also begin to develop details for a strategy to accomplish Objective 3 (*Increase the capacity of local officials, stormwater professionals, and developers to implement LID strategies by providing effective training for coastal communities).* We are in the process of planning a workshop to engage stakeholders in the review of draft materials for the manual and spreadsheet tool.

D. Benefit to NERRS and NOAA:

The project team continues to promote and collect data for a list of stormwater and LID-related research projects, database of stormwater codes and ordinances, and the LID atlas. Also, the project team has had discussions with staff from the Narragansett Bay NERR in Rhode Island regarding sharing information from the RI LID manual to include in the SC manual.

E. Describe any activities, products, accomplishments, or obstacles not addressed in other sections of this report that you feel are important for the Science Collaborative to know.

The project team continues to face staffing challenges. As mentioned above, the Climate Specialist left her position in June. The team was able to secure a new partnership relatively quickly, but the new project partners come with different skill sets and schedules, so Objective 3 (*Increase the capacity of local officials, stormwater professionals, and developers to implement LID strategies by providing effective training for coastal communities)* is slightly behind schedule. Additionally, the Project's Coallaborative and Fiscal Lead left her position as Coastal Training Program Coordinator at the North-Inlet Winyah Bay NERR in March of this year. Since that time, the Project Lead has also been serving as the Collaborative Lead and Wendy Allen, the manager of the North Inlet-Winyah Bay NERR, has taken over responsibility as Fiscal Lead. These staffing changes have understandably put a strain on remaining project staff, but aside from the Climate Intened User workshop's slight delay, the project is entirely on track.